Heavy Snowfalls Damage Virginia Pine

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About the author...

Richard H. Fenton, a research forester, received his Bachelor of Science degree in forestry at the University of Connecticut in 1933, and the Master of Forestry degree at the Yale University School of Forestry in 1939. Prior to joining the Northeastern Station, he was employed by the U. S. Geologic Survey, the Northeastern Timber Salvage Administration, and the Corps of Engineers. He served in the U. S. Navy during World War II, and joined the Forest Service in 1946. He has been with the Northeastern Station since, with assignments in New England on marketing and products investigations, and is now stationed at the Laurel Research Center in Maryland in forest-management research.

In the Coastal Plain from Virginia to Pennsylvania, snowstorms heavy enough to damage trees are unusual. Weather Bureau records for the general area show that heavy snowfall--8 to 25 inches in a single storm--occurs at an average frequency of about once in 7 years.

The winter of 1957-58 was an exception. Three major storms occurred. At the Beltsville Experimental Forest in east-central Maryland, a fall of 10 inches was recorded in early December, another 18 inches in mid-February, and another 8 to 10 inches in late March.

Each of these storms resulted in some bending, uprooting, and breaking of trees. The March snowstorm did the most damage because the snow had an extremely high water content: it had an estimated weight of 35 pounds per cubic foot. Heavy accumulations of snow damaged shrubs, wires, utility poles, and forest stands over a wide area.

The effects of the snowstorms during this exceptional winter were observed and evaluated at the Beltsville Experimental Forest for both softwood and hardwood species. Of all the native trees, Virginia pine appeared to be the most susceptible to injury; so detailed examinations were limited to this species.

The snow injury to Virginia pine was found to be related closely to tree size and stand density.

Small Trees

Injury to pine seedlings and small saplings--those 3 to 6 years old--appeared to be serious at first. Large numbers of these trees were nearly prostrate after each heavy snow (fig. 1). Even by the time growth started in the spring very few of these trees were normally erect (fig. 2). It seemed likely that permanent stem sweep or crook, with the accompanying formation of compression wood, might result during the growing season.

The rate and amount of recovery among these small trees was observed during the 1958 growing season. Measurements of total height and deviation from the vertical were taken at 30-day intervals from April 4 to October 4 (fig. 3).

By the end of the growing season, nearly all of the snow-bent seedlings had returned to a near-normal position. Most recovery occurred in the first 2 months of the growing season.

Figure 1.--This heavy snowfall has bent to the ground hundreds of 3-year-old Virginia pine seedlings. The poletimber stand of Virginia pine in the background is undamaged.

Figure 2.--After snow-melt in April, most of the seedling pines prostrated by the snow looked like this.

Some seedlings still showed moderate crook that may be permanent (fig. 4). However, such distortion will be near the base of the tree; and, as the stem expands, these crooks probably will diminish.

Thus, snow injury to trees of this size was minor and was mostly of a transient nature.

Figure 3.--Growth and recovery from snow-bending was observed monthly during the growing season. Deviation from normal vertical stem position was measured from a fixed reference point.

Saplings

Dense sapling-size stands 6 to 15 years old, 10 to 25 feet tall, and with trees 2 to 3 inches in diameter, were severely damaged. Heavily stocked Virginia pine stands of this size often contain thousands of stems per acre.

In such stands the crowns and branches are so intermeshed that they are nearly impermeable to a heavy wet snow. The slender trunks have little resistance to bending. So when enough snow weight accumulates in the canopy, not one but hundreds of small trees go down in patches or rows.

On the Experimental Forest, patches up to ¼ acre in size were prostrated. This type of damage is not unusual. Reporting on glaze damage to yellow pines in North Carolina

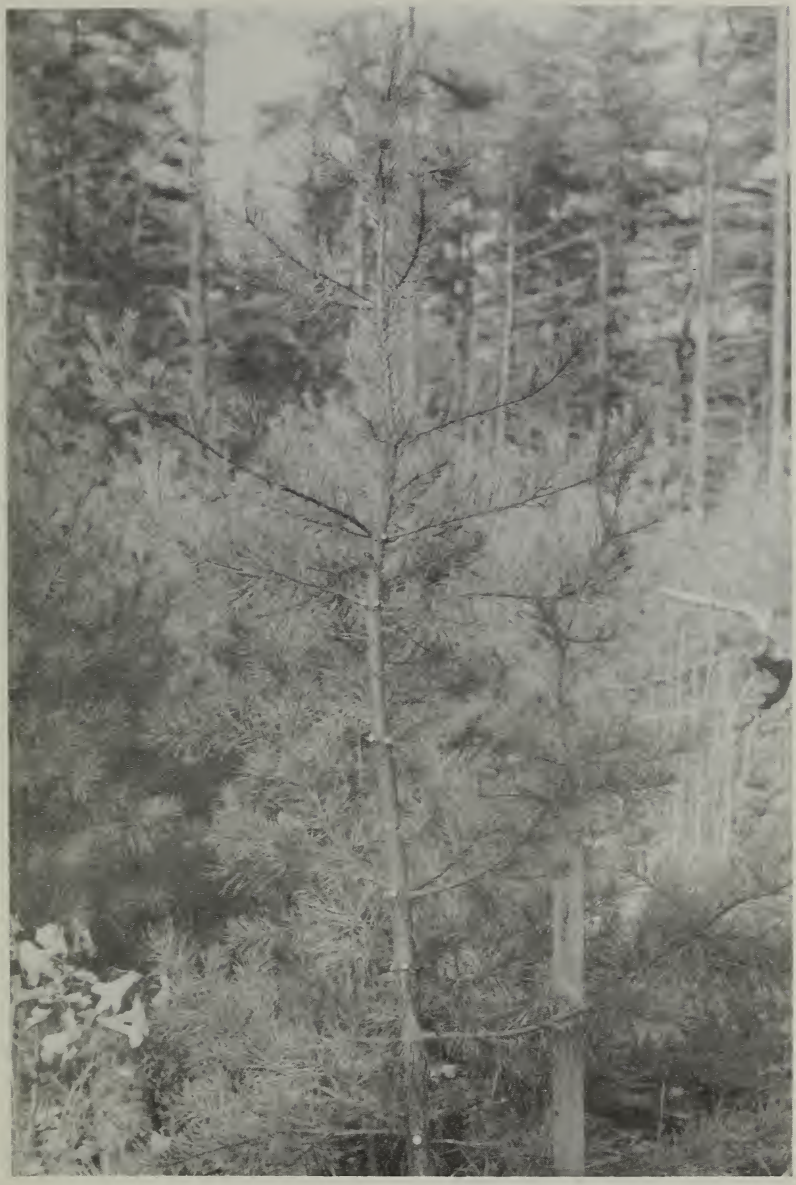

Figure 4.--By September, most of the snow-bent seedlings had regained a nearly erect position. This is the same seedling shown in Fig. 2 and Fig. 3. Lower branches were pruned prior to taking picture.

Figure 5.--Dense sapling stands were badly damaged by the heavy snowfalls. Patches of Virginia pine as large as 1/4 acre were completely ruined.

and Virginia, Downs[1] stated that severe bending and uprooting was common in dense sapling stands.

After the snow melted, the snow-felled saplings on the Beltsville Forest remained prostrate or badly bowed (fig. 5). When this occurs, the roothold becomes weakened and even partially erect trees often become victims of the next heavy snow, wind, or rain.

Basal sweep is a defect that is common in larger Virginia pines. This defect may be due to such snow damage in the early life of the tree.

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[1]Downs, Albert A. Minimizing glaze damage in pine. U. S. Forest Serv. Appalachian Forest Expt. Sta. Tech. Note 55. 5 pp. 1943.

Larger Trees

Trees of small pulpwood size--5 inches d.b.h.--and larger were resistant to snow injury. Aside from an occasional tree that was uprooted or root-sprung, damage was limited to minor top and branch breakage. Later on, resulting "flags" of brown needles were quite evident in the stands; otherwise, injury was deemed inconsequential. What damage there was occurred regardless of whether the trees were open-grown or not.

Discussion

Snowstorms severe enough to damage forest stands occur at a frequency of about once in 7 years in the Coastal Plain from Virginia to Pennsylvania. In the winter of 1957-58 snowstorms caused rather extensive damage to Virginia pine in this area. Wet, clinging, heavy snow was especially damaging. Small seedlings recovered, and larger stands were only slightly hurt; but sapling stands were severely damaged.

Certain stand treatments may be of some benefit in reducing such damage. The age at which snow damage appears to be most serious happens to coincide with the age that is thought to be best for thinning Virginia pine. Opening up the canopy by thinning might lead to more sturdy stems and reduce snow interception, and thus reduce the hazard. On the other hand, lessening of mutual support by thinning a tight stand might induce an undesirable effect.

Little information is available on this point. Rushmore[2] found that damage from ice storms in southern Maryland was about the same for Virginia pine in thinned stands as in unthinned stands. But Slocum and Miller,[3] reporting on glaze damage in North Carolina, say that thinned plots in a 24-year-old stand were completely destroyed by ice while an unthinned check plot was undamaged.

Further study is needed to find forest-management practices that will minimize injury and loss from snow.

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[2]Rushmore, Francis M. Thinning Virginia pine stands in Maryland--a ten-year experience. Unpublished manuscript, Northeast. Forest Expt. Sta. 38 pp. 1949.

[3]Slocum, G. K., and Miller, W. D. Virginia pine. N. C. Expt. Sta. Tech. Bul. 100. 52 pp. 1953.


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